



Interface to the Future
- Solution by Smart Connectivity -

THine Electronics, Inc. (TSE: 6769) FY2023Q1 Business Results and Opportunities

2023.05.08

Mid-term Strategy from 2022 to 2024

5G&Beyond-NE

TODAY'S AGENDA

- Corporate outline
- Business results in FY2023Q1
- Future opportunities under mid-term strategy, “5G&Beyond-NE”

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Corporate outline: Provider of unique value to the world,

Interface to the Future
- Solution by Smart Connectivity -

de facto standard technology of high-speed interface, etc.

- Company Name THine Electronics, Inc.
(listed on Tokyo Stock Exchange, code: 6769)
- Founder & CEO Tetsuya Iizuka, Ph. D
- President & COO Yoichiro Minami
- Capital 1,175 million Yen
- Founded May, 1991
- Incorporated June, 1992
- Business Area Planning, Designing and Sales of Mixed Signal LSI and Providing AI & IoT devices and solutions
- Employees 129 (consolidated basis as of March 31, 2023)



THine teams



Korea

THine Electronics Korea, Inc.
Seoul, Korea
Established in Mar. 2010

United States

THine Solutions, Inc.
Santa Clara, CA USA
Established in Feb. 2018

China

賽恩電子香港股份有限公司
THine Electronics Hong Kong, Co., Ltd.
Established in Nov.2012
前海賽恩电子(深圳)有限公司
THine Electronics Shenzhen, Co., Ltd.
Established in May 2013
上海分公司
Established in Oct.2013



Tokyo – Headquarters –



Tokyo, Japan
Start-up in May 1991

Cathay Tri-Tech

Yokohama, Japan
Acquired in Dec., 2018

Taiwan

哉英電子股份有限公司
THine Electronics Taiwan, Inc.
Taipei, Taiwan
Established in Sep. 2000



Business area

Product and solution

Application market

LSI
Biz.

<High-speed interface LSI>

V-by-One[®] HS plus
V-by-One[®] HS
V-by-One[®]
LVDS

Serial Transceiver IOHA:B

<Image signal processing>
Image Signal Processor
Camera Development Kit



- Camera solution: automotive cameras, security cameras, AR/VR, recognition camera, medical cameras, etc.
- Display solution: high-resolution displays such as 8K / 4K, gaming monitors with high refresh rate
- Drive recorders, automotive CID, exp. for EVs
- Mobile, PC, and single board computers
- OA (multi-function printers), amusement
- Industrial equipment such as inspection equipment for semiconductors and LCD displays

AI
&
IoT
Biz.

<Wireless modules>

5G/LTE/NB-IoT

<AI&IoT devices and solution>

IoT Gateway / Router

Edge AI Processor / Module

AI & IoT Solution



- Drive recorders with wireless modules
- AED monitoring modules
- IP transceivers
- Remote monitoring module for vending machines and elevators
- GPS tracker
- AI thermography with facial recognition
- IoT monitoring system for

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Financial performance in FY2023Q1

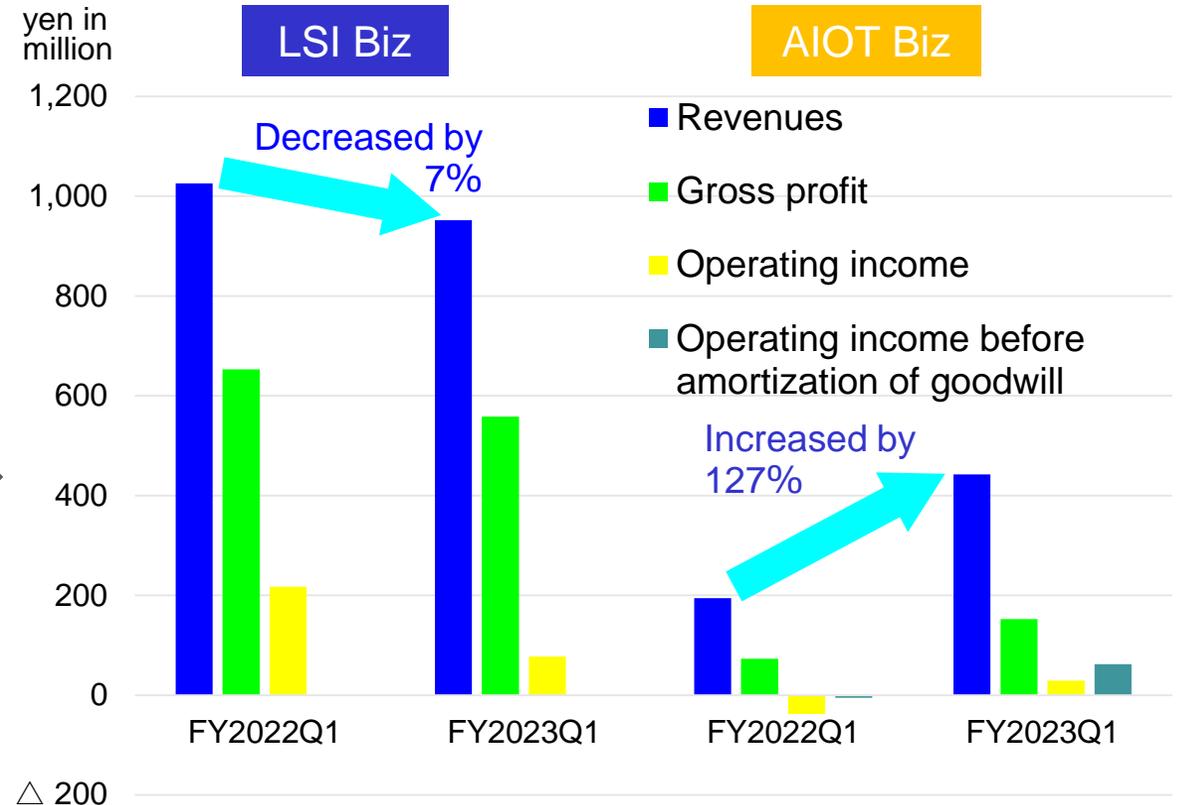
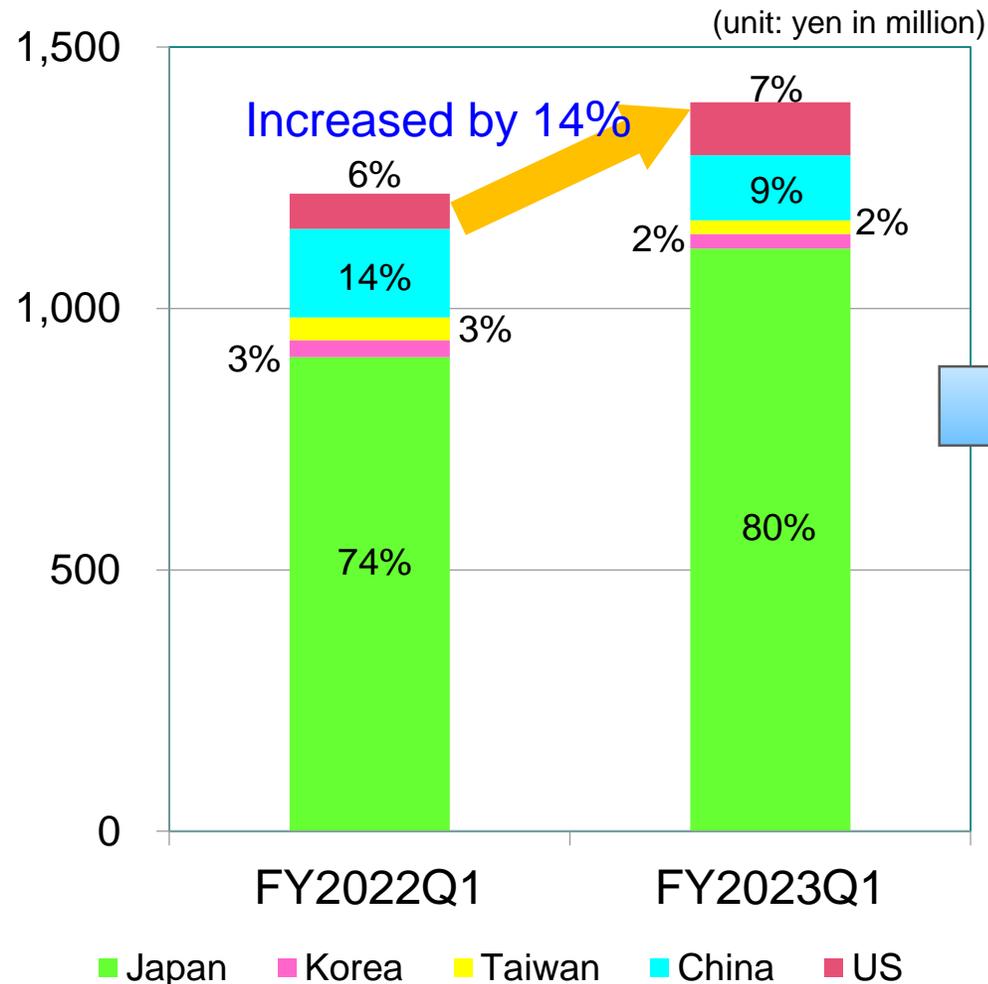
► Consolidated financial results

(yen in million)

	FY2023Q1			FY2022Q1	
		Portion%	YoY		YoY
Revenues	1,394	100.0	114.3	1,219	100.0
Gross Profit	710	51.0	97.8	726	59.5
SG&A	603	43.3	110.5	546	44.8
(R&D expenses)	250	18.0	119.7	209	17.2
Operating Income	106	7.7	59.3	179	14.7
Ordinary Income	116	8.3	39.1	297	24.3
(Reference purpose only) Ordinary Income without FX effects	107	7.7	59.8	180	14.8
Net Income Attributable to Owners of the Parent	75	5.4	38.4	197	16.2

Financial performance in FY2023Q1 by region and segment

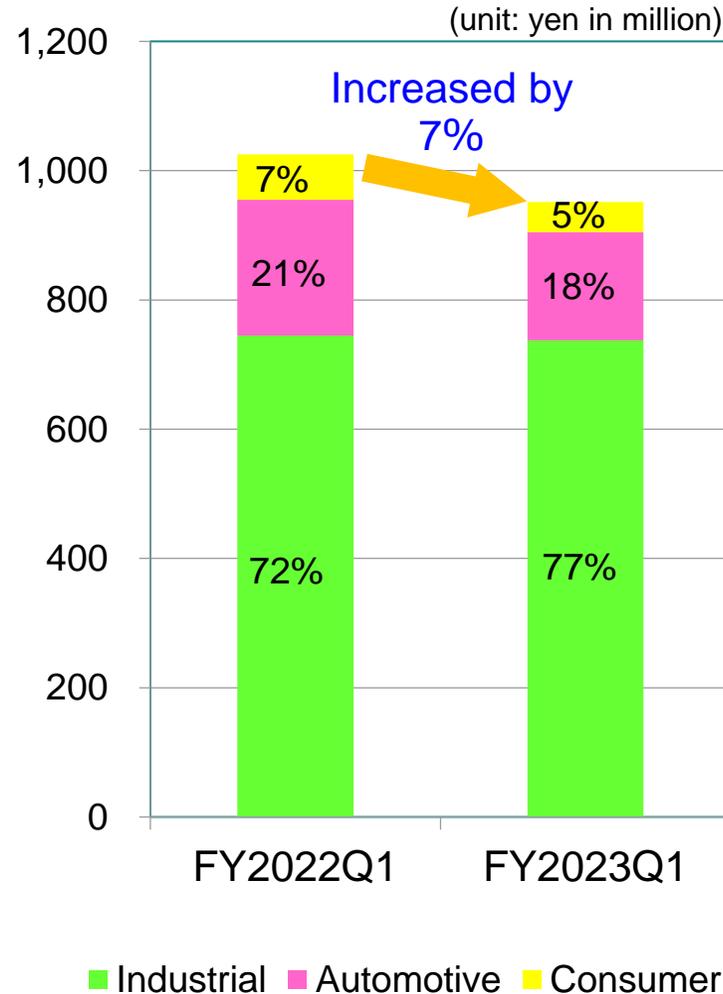
▶ Revenues by region



- ▶ LSI Biz totally decreased, affected by customers' inventory adjustment while the amusement business increased more than initially expected.
- ▶ AIOT Biz made significantly successful growth since shipments were strong from FY'22Q4, mainly to large customers.

Financial performance in FY2023Q1 by region and segment

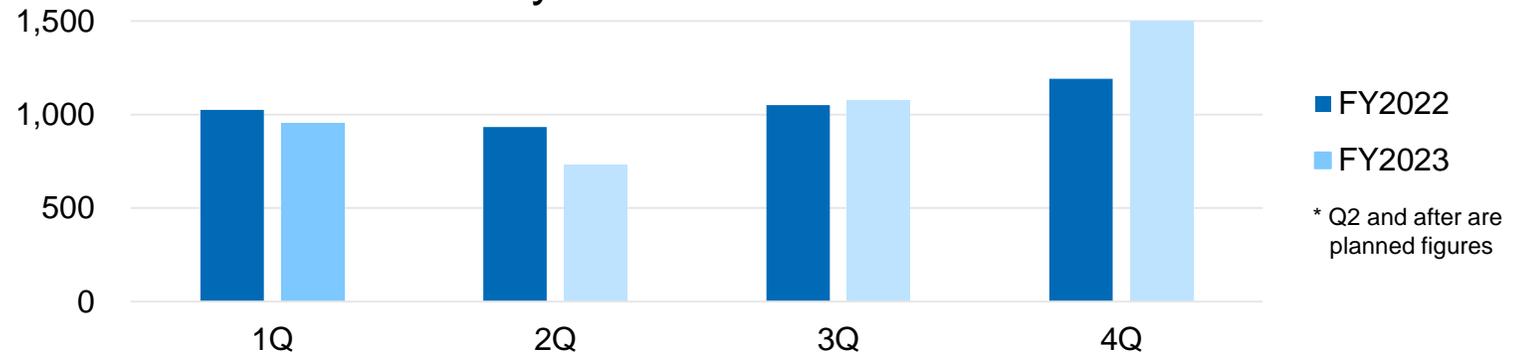
► Revenues by region



Analysis	
Industrial: decreased by 1% (77% of total)	Approximately the same level of revenue than FY'22Q1. Shipments for amusement drastically increased by 74% while OA and others decreased by 30% and 14% respectively.
Automotive: decreased by 20% (18% of total)	The US business made successful increasing by 73% while the China business decreased by 76% affected by the inventory adjustment.
Consumer: decreased by 33% (5% of total)	Since June launching the new standard interface technology V-by-One [®] HS plus for high-resolution television and display markets as a solution to eco-design regulation in EU and US

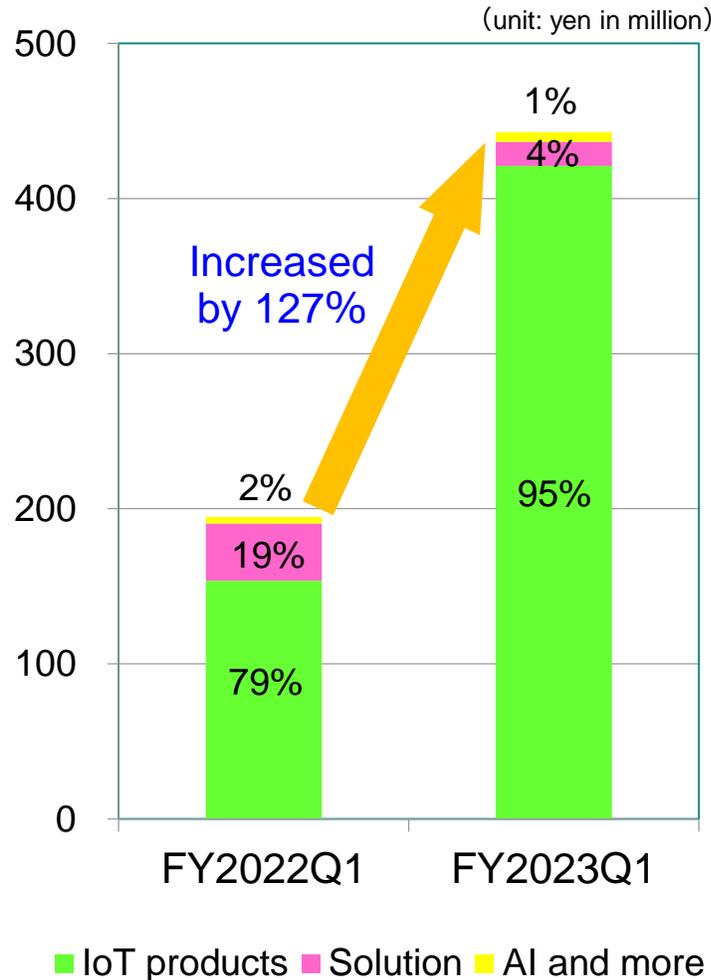
(unit: yen in million)

Quarterly-based sales in LSI business

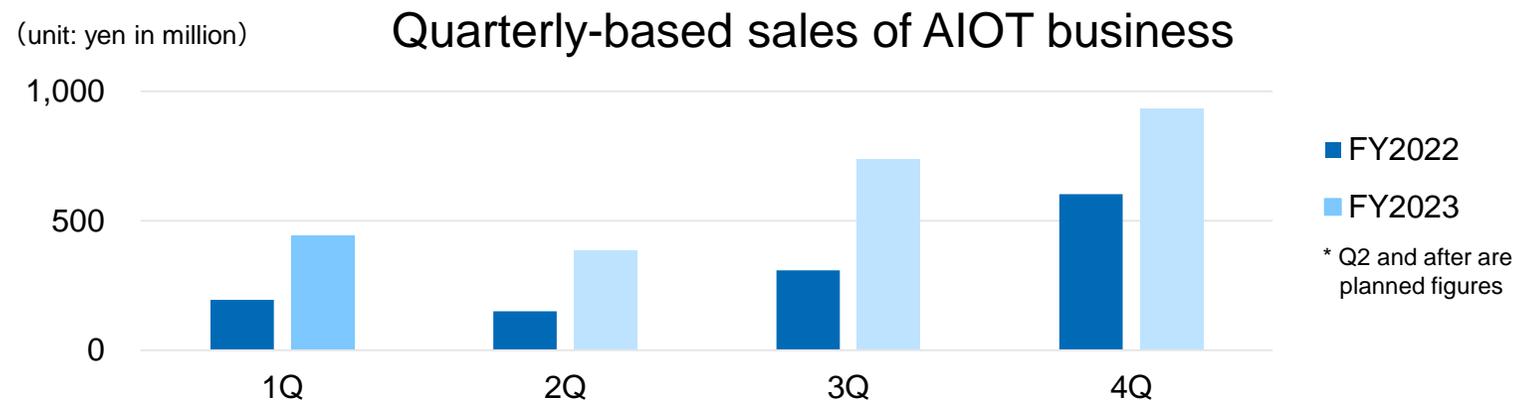


Financial performance of AIOT business in FY2023Q1 by segment

▶ Revenues of AIOT business segments

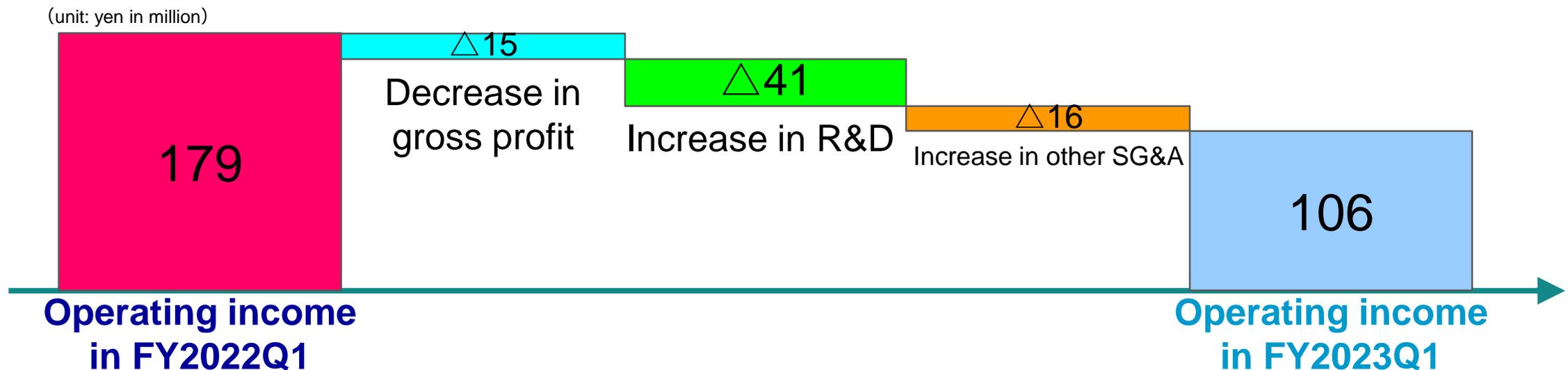


Analysis	
IoT products: increased by 174% (90% of total)	Large-lot-customer business in drive recorders, vending machines, and elevator monitoring systems, AED, etc. made successful shipments resulted in significant increase.
Solution: decreased by 58%	Development in providing solution performed well while business in a few customers delayed.
AI and more: increased by 44%	Focusing on newly developing solutions and products. AI-based thermometer Biz almost over due to exit from COVID-19.



Financial performance in FY2023Q1 compared to that in FY2022Q1

- ▶ Reason of changes in operating income
 - Gross profit decreased by 2%. AIOT business made more than double and increased by 108%, while LSI business decreased by 14%.
 - Made intensive investment in research and development (R&D) with JPY250M, increased by 20%: developing the advanced high-speed interface standard “V-by-One[®] HS plus” technology, new V-by-One[®] HS products for display panels in EVs, high-speed serial transceiver products, advanced redriver technology, modules for edge AI, gateway products with voice communication, etc.
- * Also continued government-contracted R&D project using 300GHz communication mostly at the cost of MIAC



Financial performance of R&D in FY2023Q1

- ▶ Intensive investment in R&D
- R&D investment plan in FY2023: totally JPY1,210M (increased by 20%)

R&D plan in FY23



Actual R&D investment in FY2023Q1

- **JPY250M**
- compared to the plan: 86%
- compared to FY21: 120%



- New high-speed interface standard “V-by-One[®] HS plus” technology
- New V-by-One[®] HS products for display panels of EVs
- The industry-first serial transceiver products for sensing controlling systems
- High-speed redriver technology
- Voice-communication-support drive recorder products
- Modules for edge AI processing
- Voice-communication-support gateway products
- High-speed wireless communication technology applicable to 1000Gbps data transmission (beyond 5G), etc.

Financial performance in FY2022

► Outline of Balance Sheet as of the end of March, 2023

(unit: yen in million)

	Assets		Liabilities and Net Assets		
	End of FY'23Q1	End of FY'22		End of FY'23Q1	End of FY'22
Cash and Cash Equivalent	7,689	7,302	Account Payable	314	282
Account Receivables	577	1,058	Other Current Liabilities	435	515
Inventories	907	1,048	Non-current Liabilities	136	136
Other Current Assets	564	358	Shareholders' Equity	9,407	9,494
Property, Plant and Equipment	208	206	Accumulated Other Comprehensive Income	59	59
Intangible Assets	115	148	Deferred Stock-based Compensation	133	128
Investments and Others	484	547	Non-controlling Interests	59	52
Total Assets	10,546	10,669	Total Liabilities and Net Assets	10,546	10,669

► US-dollar-based cash as of the end of FY'23Q1 is approximately US\$7M.

► Goodwill by acquisition of Cathay Tri-Tech (AIOT business) is JPY97M in intangible assets. The amortization of goodwill will be completed in FY23.

Financial performance in FY2022

▶ Outline of Cash Flow Statements

(unit: yen in million)

	FY2023Q1	FY2022Q1
CF from Operating activity	519	△69
CF from Investing activity	19	2
CF from Financing activity	△162	△129
Effect of Exchange Rate Changes	10	120
CCE at the beginning of year	7,302	7,743
CCE at the end of year	7,689	7,666

- ▶ increase in net income bf tax, AR and inventories
- ▶ investment in fixed asset, dividend from VC investment, etc.
- ▶ Dividend payment, etc.
- ▶ Exchange rate
JPY133/USD as of the end 2022
JPY133/USD as of the end 2023Q1

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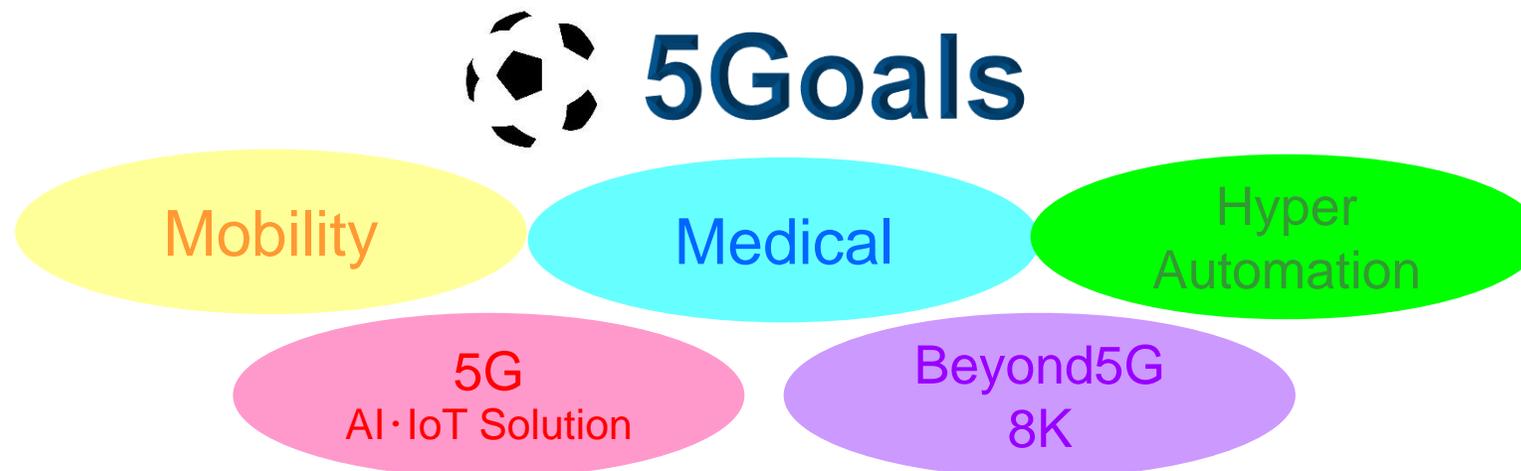
5G&Beyond-NE, the mid-term strategy from 2022 to 2024

▶ Outline of “5G&Beyond-NE”

<Basic strategy>

THine provides differentiated values for customers based on the prior mid-term strategy, “5G&Beyond,” corresponding to business environment, and contribute to customers’ innovation.

THine re-defines “**Strategic 5 Goals**”, focuses on growing application markets, and aims to achieve x3 operating income in FY2024, compared to FY2021.



5G&Beyond-NE, the mid-term strategy from 2022 to 2024



Beyond5G/8K
(contribution to emerging use cases)
Beyond5G technology applicable to
1000Gbps communication and 8K videos



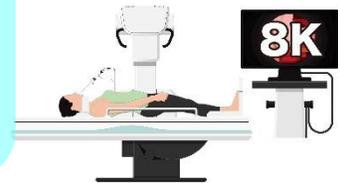
5G/AI•IoT Solution
(contribution to IoT communication)
5G wireless communication
face recognizing solution
smart meters

Mobility
(contribution to automotive evolution)
Automotive high-resolution /
multiple cameras and displays



Hyper Automation
(contribution to industrial IoT)
Serialize various IoT sensing data

Medical
(contribution to health care)
Medical cameras (endoscopes)
and high-resolution monitors



5G&Beyond-NE, the mid-term strategy from 2022 to 2024

▶ Action in FY2023

- ① Enhance growing business in **automotive and industrial markets**, contributing to support new use cases of autonomous, unmanned, and remoted situation
- ② Continuously launch new LSI products for **automotive cameras and displays**, targeting automotive markets in China
- ③ Promote products and solutions for **smart IoT communication, including drive recorders and smart meters**
- ④ Cultivate future growing opportunities in **5G, AI&IoT, medical**
- ⑤ Positively invest in **research and development** as well as **talented HR** to create value from new products
- ⑥ Achieve operational excellence in **highly-collaborative sales and production functions**, to meet customers' demand under extremely tight situation in fabrication capacities

5G&Beyond-NE, the mid-term strategy from 2022 to 2024

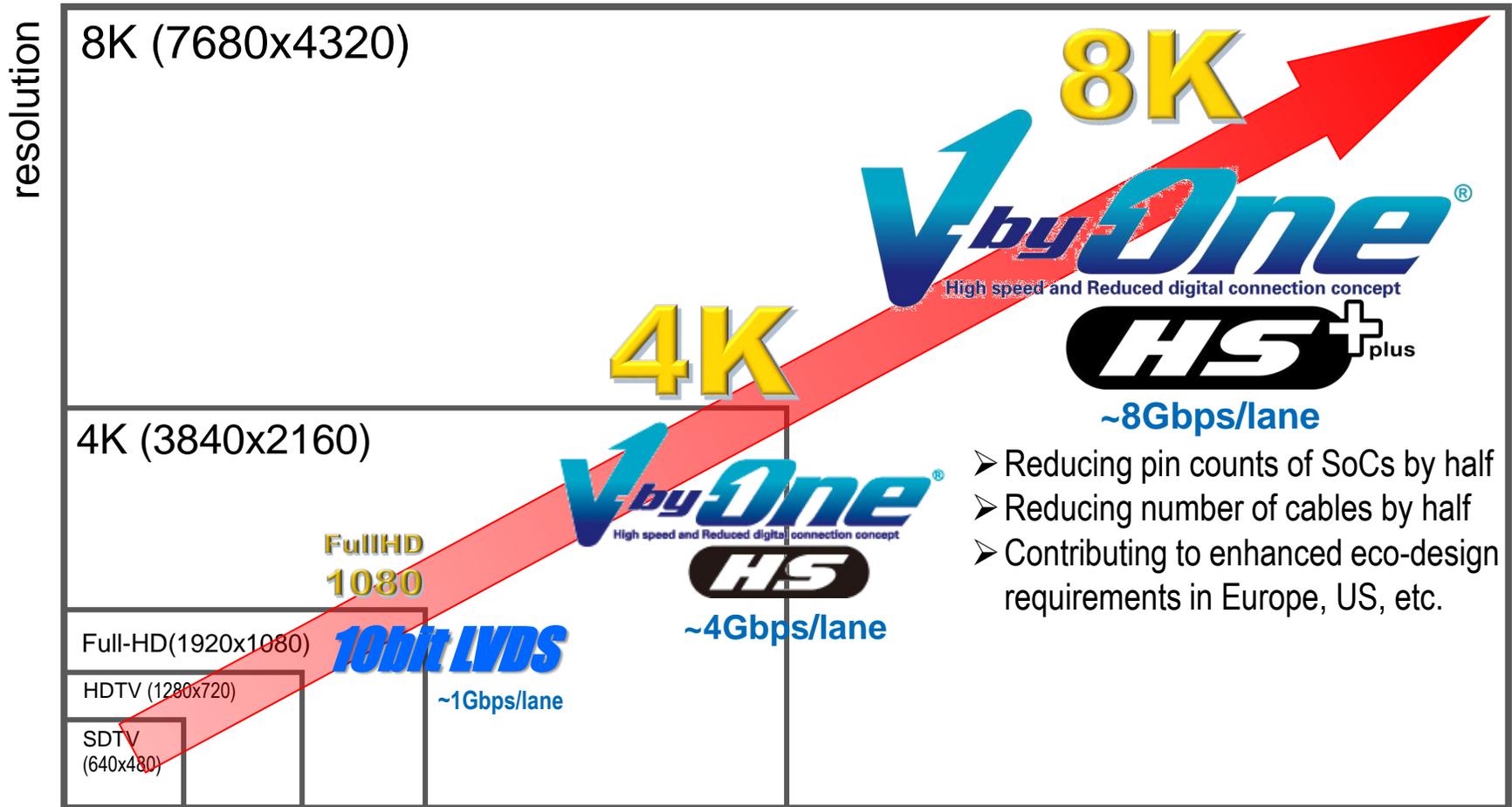
► Contribution to video data transmission

Mobility

Medical

Beyond 5G/8K

Pioneering high-speed interface technology, including *de facto* standard



Contribution to TV's evolution

2003 Launched the industry-first 10-bit LVDS in volume production, supporting 1.07-billion color depth, compared to 16.4-million colors at the time

2011 THine's V-by-One® HS became *de facto* standard of the internal interface of TVs, licensing it to hundreds of licensees. In 2012, IEEE gave THine an honorable award for pioneering *de facto* standard for moving

2023 Launched the new standard V-by-One®HS plus to achieve energy-efficiency TVs and gaming monitors

- Reducing pin counts of SoCs by half
- Reducing number of cables by half
- Contributing to enhanced eco-design requirements in Europe, US, etc.

5G&Beyond-NE, the mid-term strategy from 2022 to 2024

- ▶ Contribution to high-speed video data transmission

Mobility

Medical

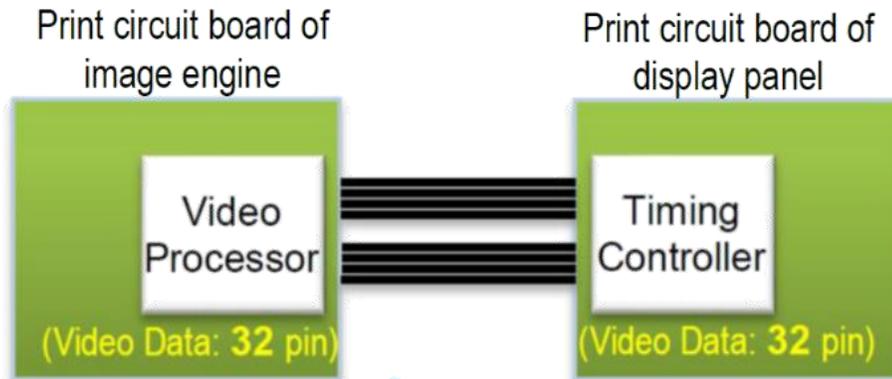
Beyond 5G/8K

Providing “V-by-One[®]HS plus Standard” since June, 2023

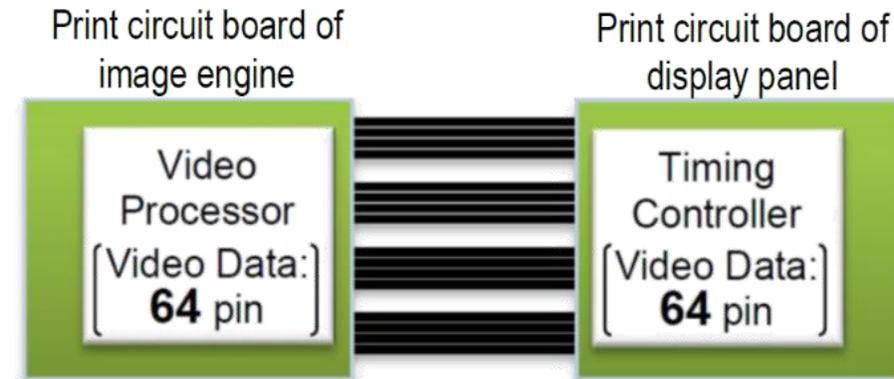
- Double-speed interface technology of today’s *de facto* standard V-by-One[®] HS for 4K/8K TVs and displays
- Contributing to enhanced eco-design requirements in Europe, US, etc.

Comparison of video data transmission systems in case of 8K60fps or 4K240fps

Video data transmission by V-by-One[®] HS plus
Only 16 lanes required, reducing pin counts of LSIs and lowering power consumption



Current video data transmission
requires **32 lanes**



* These images are for illustrative purposes only.



5G&Beyond-NE, the mid-term strategy from 2022 to 2024

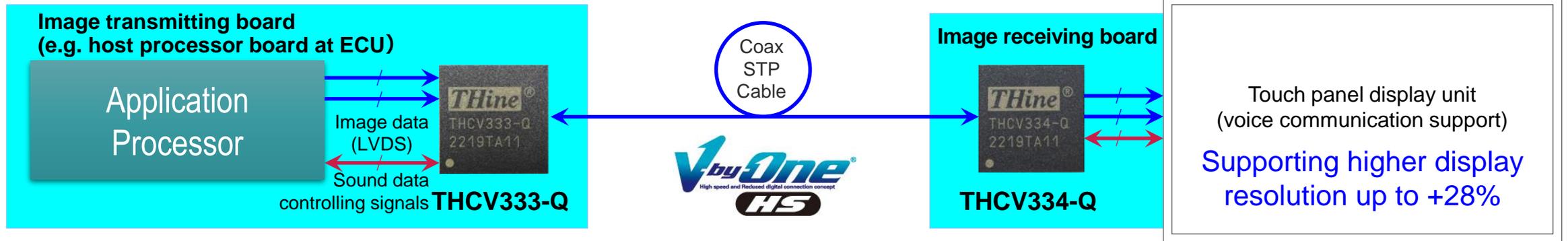
Mobility

Hyper Automation

- ▶ Enhancing user experience – simplifying cable wiring solution for in-vehicle touch panels for EVs

Start volume production shipping of new V-by-One®HS products for EVs and industrial equipment

- Enabling to transmit and receive fullHD60fps images, controlling signals, and voice signals only with 1 chip
- Capable to handle approximately +28% more data volume, compared to similar-class products in automotive industry
the world-fastest class SerDes support OpenLDI(LVDS)



- 1) Automotive in-vehicle touch panel display
 - Information display
 - Rear seat entertainment
 - Navigation
 - Display Audio



- 2) Industrial embedded touch panel display
 - HMI/programmable display
 - Vending machines with touch panel
 - Elevator interior panel
 - Traffic monitors

5G&Beyond-NE, the mid-term strategy from 2022 to 2024

- ▶ Contribution to high-resolution cameras

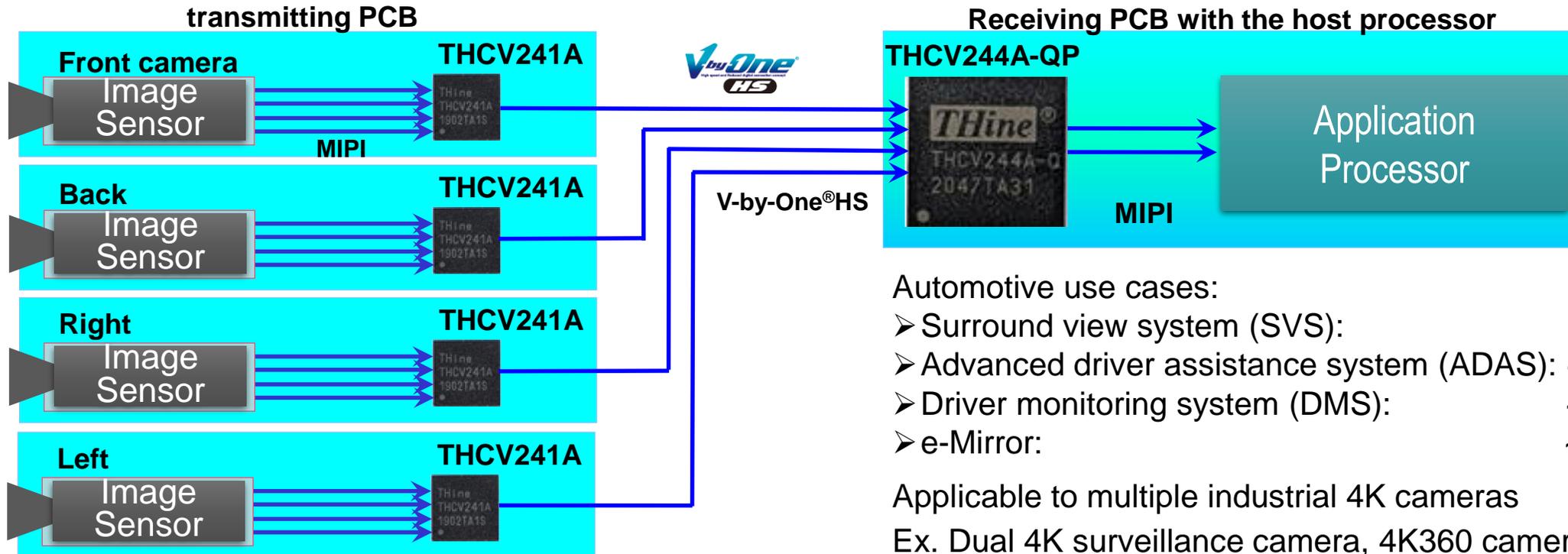
Mobility

Medical

Hyper Automation

4-camera-supporting V-by-One[®]HS

- Receiving max.4-camera images of full-HD60fps
- The lowest power consumption in the industry with enhanced noise tolerance



Automotive use cases:

- Surround view system (SVS): 4 cameras
- Advanced driver assistance system (ADAS): ~ 3 cameras
- Driver monitoring system (DMS): ~ 3 cameras
- e-Mirror: ~ 3 cameras

Applicable to multiple industrial 4K cameras

Ex. Dual 4K surveillance camera, 4K360 camera, dual 4K drone camera, dual unmanned cash register camera

5G&Beyond-NE, the mid-term strategy from 2022 to 2024

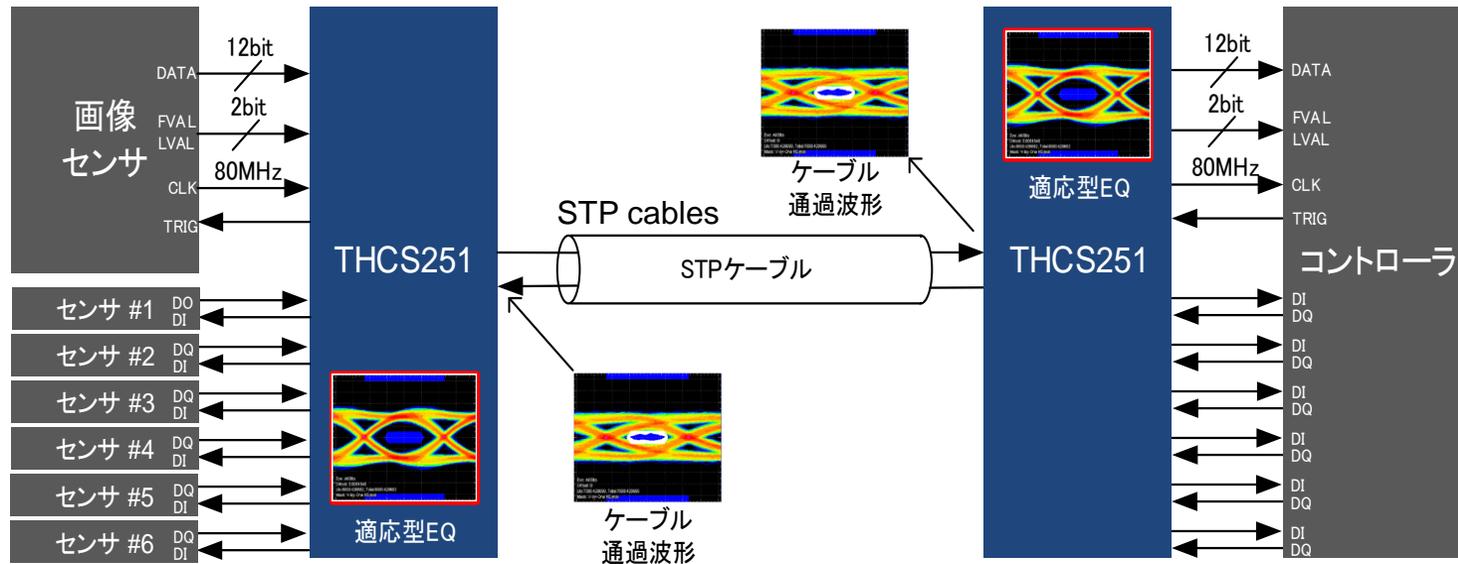
- ▶ Contribution to industrial IoT by achieving flexible fabrication change

Hyper Automation

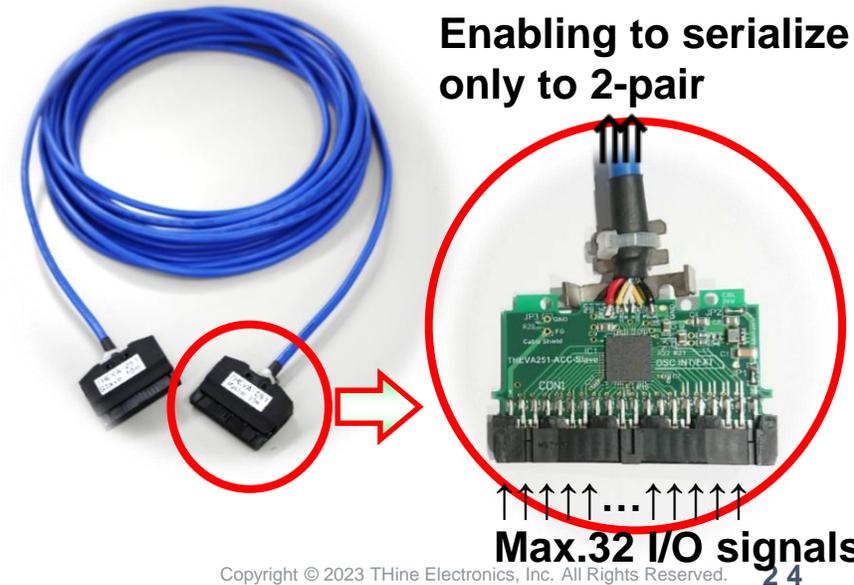
Serial Transceiver **IOHA:B** solution THCS25x can serialize max.35-bit I/O into 2-pair data transmission

- Enabling to add new sensing modules to manufacturing process or distribution warehouse process afterward
- No need of expert knowledge in signal wiring, reducing re-design period, designing costs, number of cables, achieving longer-distance data transmission
- Active cable solution to simplify the complicated IoT sensing and controlling can be available

Various types of sensors



Sample of an active cable with the serial transceiver product



5G&Beyond-NE, the mid-term strategy from 2022 to 2024

▶ Contribution to industrial DX cameras

Mobility

Medical

Hyper Automation

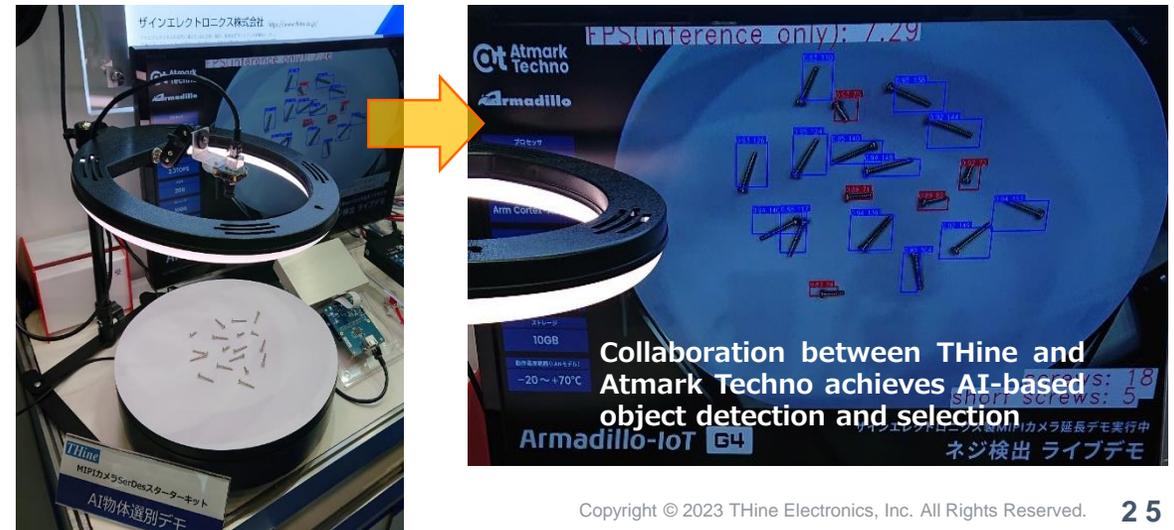
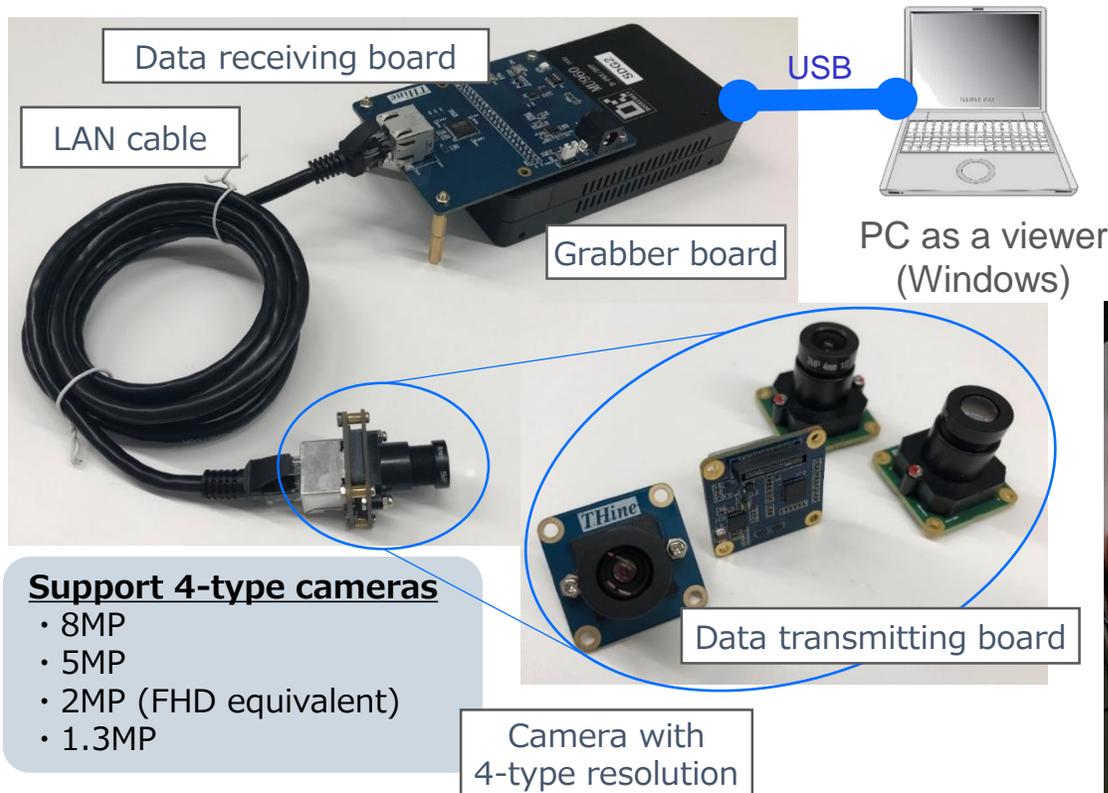
5G AI/IoT

Starter Kit to build SerDes system for MIPI cameras

- Enable camera data transmission for max. 15 m
- Shorten designing period of camera system drastically

Application:

- Monitoring manufacturing lines
- AI-camera-based inspection
- Monitoring distribution warehouse, conveying lines
- Monitoring growth of agricultural products
- In-vehicle cameras of trains, buses, and large vehicles
- Monitoring infrastructure, fuel storage facilities, etc.



5G&Beyond-NE, the mid-term strategy from 2022 to 2024

- ▶ Real-time-based AI image diagnosis from remoted video cameras

Hyper Automation

5G AI/IoT

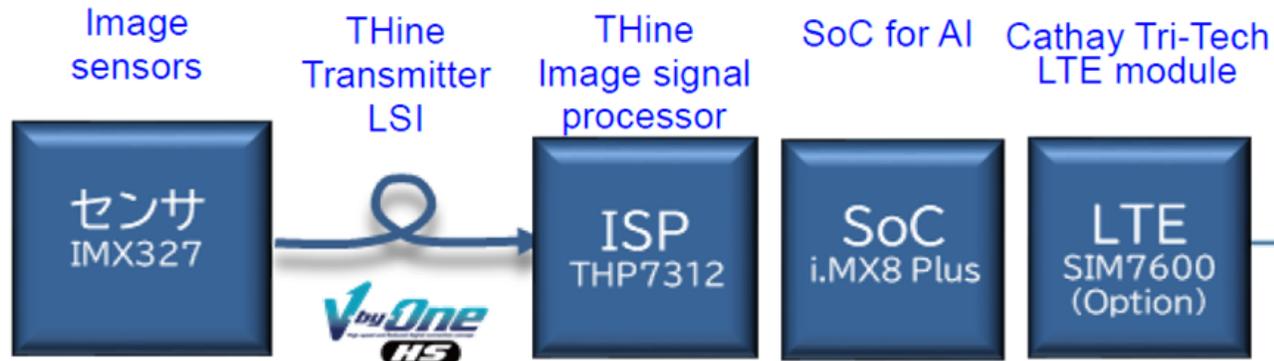
Solution by EdgeAI-Link™, a cloud-linked Edge-AI cameras

Advantages to use cloud-linked Edge-AI in addition to Cloud-AI:

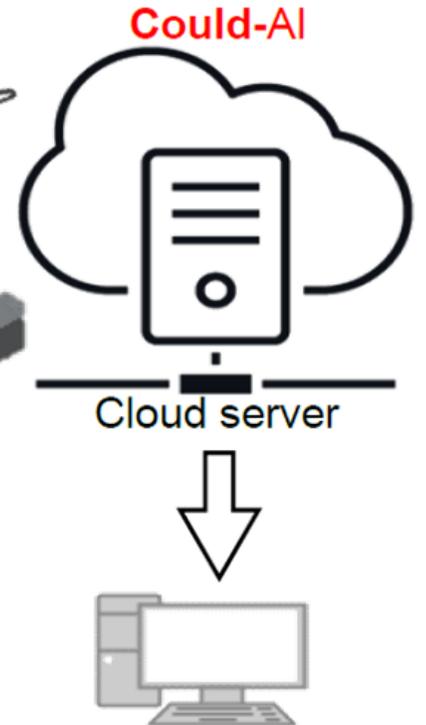
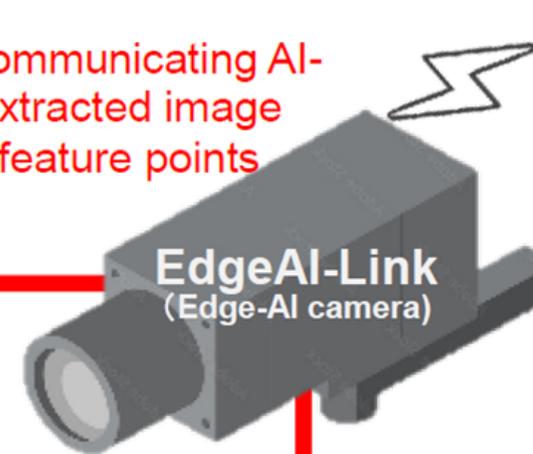
- Achieving real-time AI diagnosis
- Drastically reducing costs of video data communication with AI diagnostic accuracy
- No need to communicate privacy data to cloud servers

EdgeAI-Link™, a cloud-linked Edge-AI camera

Edge-AI camera extracts image feature points



Communicating AI-extracted image feature points



Real-time AI diagnosis available from remoted cameras

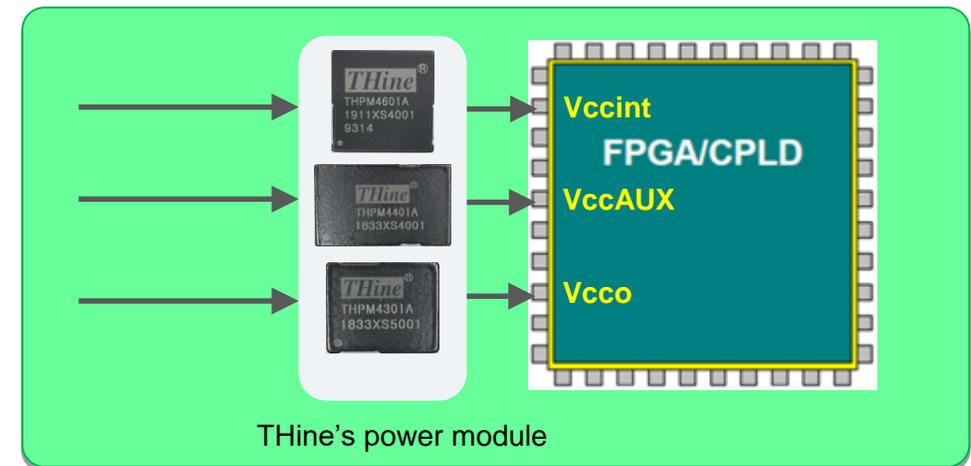
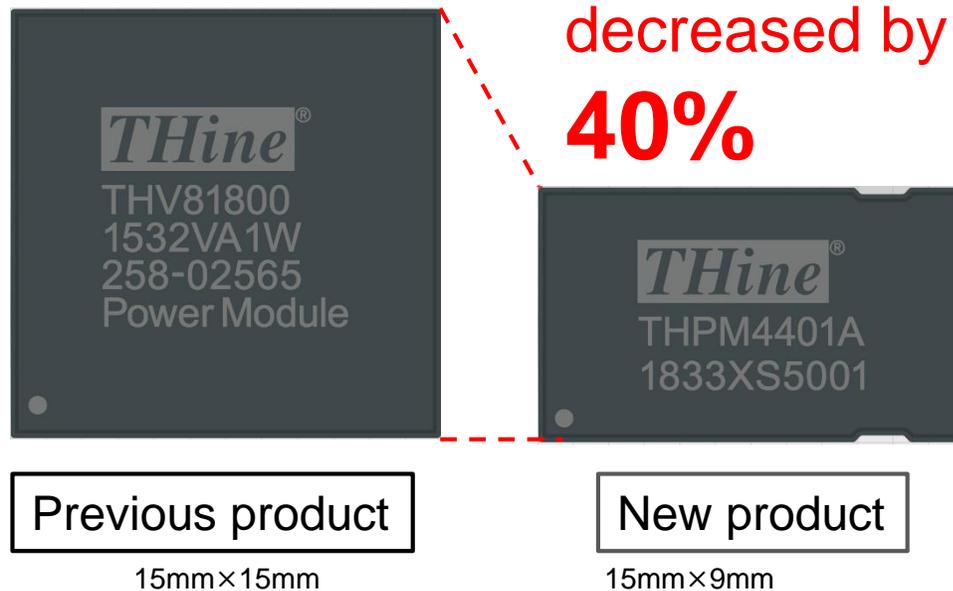
5G&Beyond-NE, the mid-term strategy from 2022 to 2024

- ▶ Reducing designing hours and developing period

Hyper Automation

Advanced power module products

- Module products of complicated power supply circuits, achieving miniaturization, higher-efficiency, excellent heat dissipation by original packaging technology
- Suitable for the most advanced LSI, for example FPGA · SoC · ASSP, etc.



THine's optimized power modules enable system developing engineers to reduce designing hours and developing period

5G&Beyond-NE, the mid-term strategy from 2022 to 2024

► TVS for high-speed data transmission

Mobility

Medical

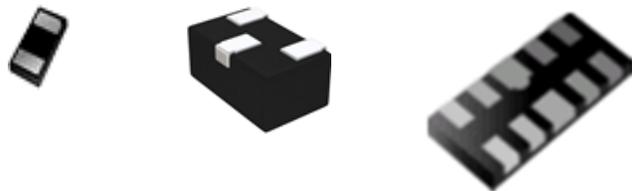
Hyper Automation

5G AI/IoT

Protect costly processors using advanced miniaturized manufacturing process

THine's TVS (Transient Voltage Suppressor) solution suitable for protecting processors with high-speed data communication

- Protect processors and SoCs from static electricity and power fluctuation
- Keep high-speed signal integrity
- Small package, suitable for data line of HDMI, DisplayPort, USB3.0 Type-C, CML, Ethernet, LVDS, MIPI, etc.



Line-ups of TVS products
(from the left, THTVS411, THTVS312, THTVS514)

Product number	THTVS411 Small package	THTVS312 Small-sized 2ch product, suitable for differential lanes	THTVS514 Standard 10-pin package, suitable for differential 2 lanes
Package	0603 (0.6x0.3x0.25mm)	1006 (1.0x0.6x0.4mm)	2510 (2.5x1.0x0.55mm)
Frequency	DC ~ 8GHz	DC ~ 6GHz	DC ~ 6GHz
V _{rw} Max	4V	3.6V	5.5V
IEC6100-4-2 test results			
Contact	±20kV	±17kV	±12kV
Air	±25kV	±20kV	±17kV

5G&Beyond-NE, the mid-term strategy from 2022 to 2024

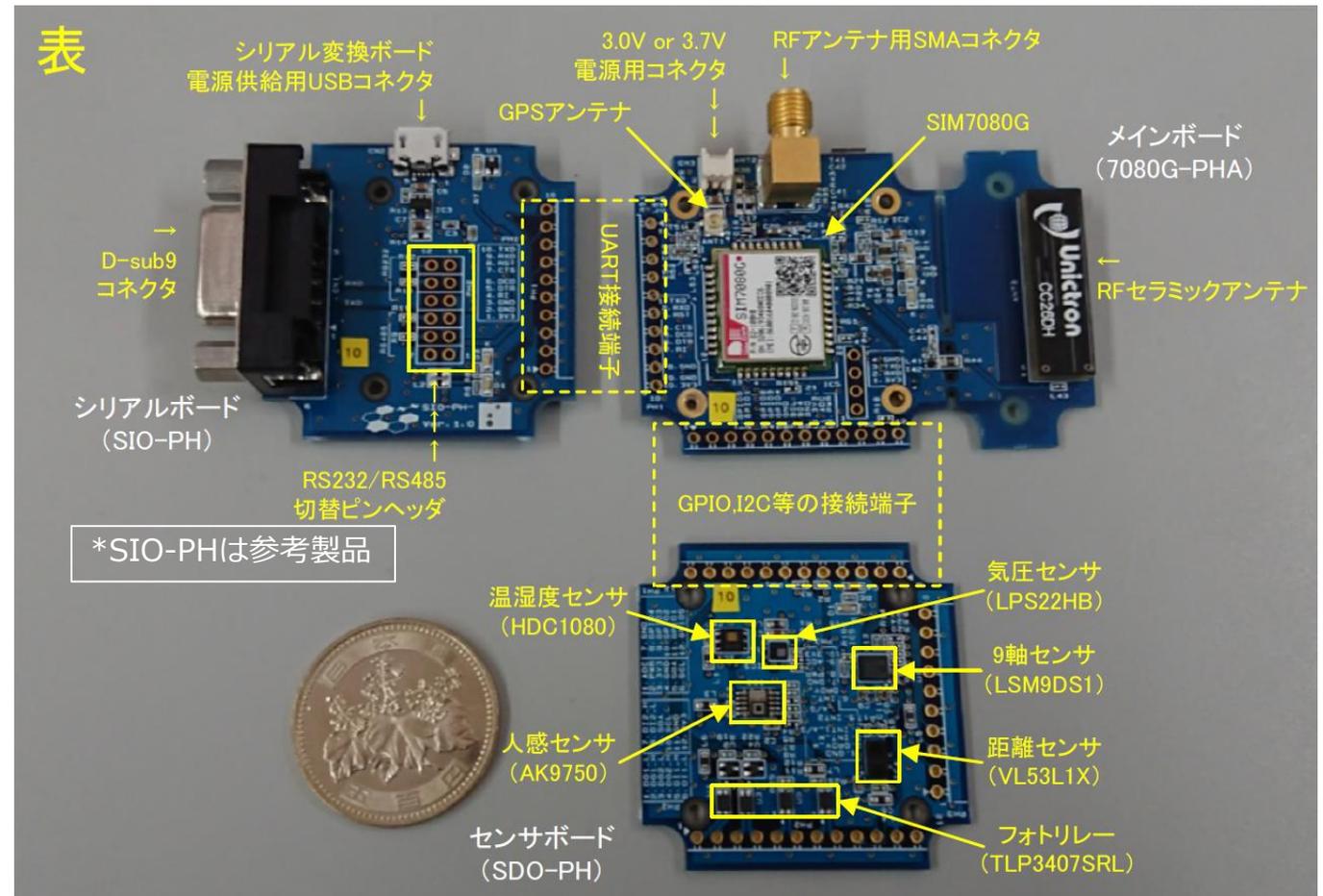
▶ contribution to sensing IoT

5G AI/IoT

IoT modem board product: 7080G-PHA

◆ specification :

- ❑ Supporting Rel.14-based Cat-M1/NB1/NB2 with global module applicable to Japanese 3 carriers as well as abroad carriers
- ❑ Loading various sensors and building IoT system readily on small-sized PCB with cellular and GPS antenna
- ❑ Extension board available to support serial port of RS232C/485
- ❑ Direct connect pin available to each functional port on the module
- ❑ Ultra-low voltage designing suitable for dry batteries
- ❑ Supporting MicroSIM card (3FF), eSIM (inside / outside), and SoftSIM
- ❑ Loading RTOS(TX3.0) to support Edge-based processing or outside-based control with using memory area of modules



5G&Beyond-NE, the mid-term strategy from 2022 to 2024

► Contribution to various IoT use cases

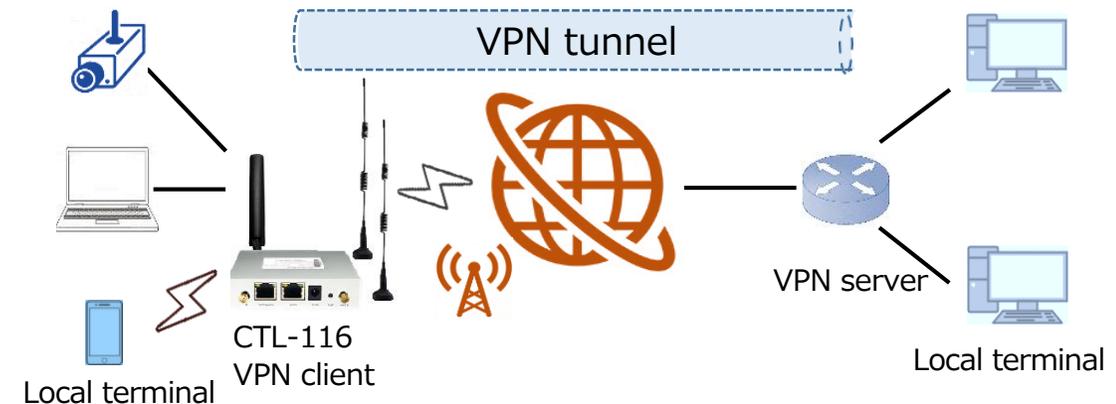
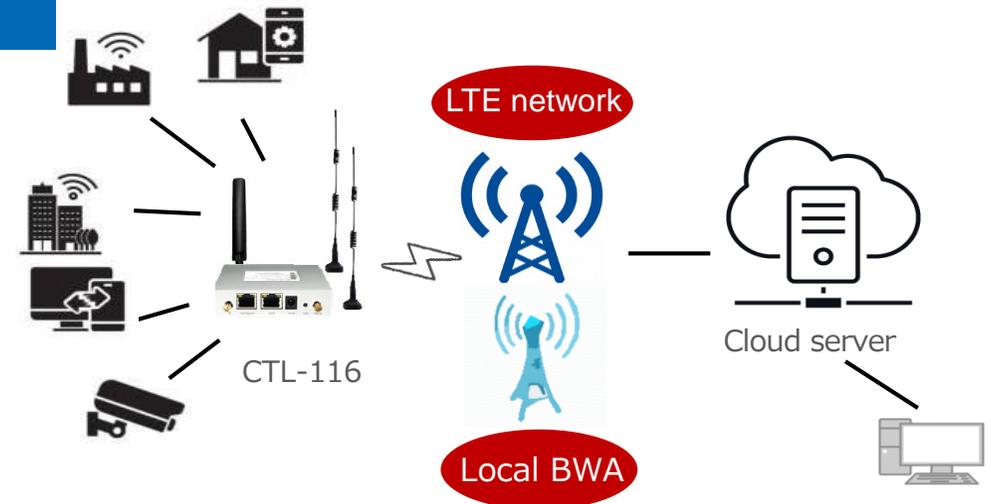
5G AI/IoT

Wireless LAN router with LTE module: CTL-116



■ Features of CTL-116

- 1) Supporting domestic communication carriers (NTT DoCoMo, KDDI, KDDI, SoftBank, and Rakuten Mobile*) and MVNO with loading SIM7600JC-HG
* Supporting Rakuten Mobile is a future plan.
- 2) Supporting local BWA, private LTE
- 3) Supporting wireless LAN (IEEE802.11b/g/n)
- 4) Supporting VPN
- 5) Supporting VRRP, enabling redundancy (switchable from master in back up mode)
- 6) Supporting SNMP, enabling to monitor and control routers remotely
- 7) Small and light design: 99.7x98.7x23.4 mm with approx. 250g
- 8) Wide temperature support: -30°C~75°C



5G&Beyond-NE, the mid-term strategy from 2022 to 2024

- ▶ Contribution real time air traffic control of drones and eVTOLs

Mobility

5G AI/IoT

Capital and business alliance with Terra Drone

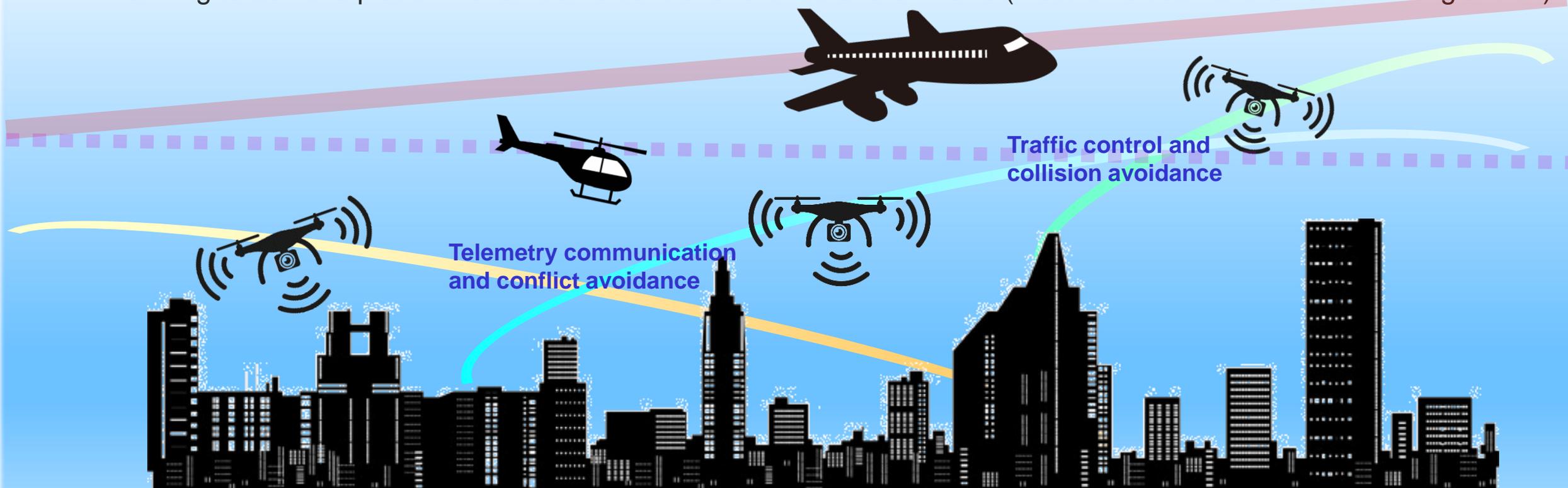


TERRA DRONE



Cathay

Jointly developing transponder communication modules for UTM (Unmanned Aerial System Traffic Management), aiming to achieve platform of air traffic control of drones and eVTOLs (Electric Vertical Take-Off and Landing aircraft)



5G&Beyond-NE, the mid-term strategy from 2022 to 2024

▶ Solution for Beyond 5G

Beyond 5G/8K

Develop beyond5G technology applicable to high-speed communication at 1000Gbps

the National Institute
of Information and
Communications
Technology (NICT)

国立研究開発法人
情報通信研究機構

Hiroshima University

国立大学法人
広島大学

Ministry of Internal
Affairs and
Communications

総務省

Tokyo University
of Science

学校法人
東京理科大学

THine[®]

8K TV, remote medical diagnosis,
eSports, etc.

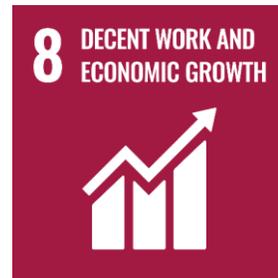
Nagoya Institute
of Technology

国立大学法人
名古屋工業大学

5G&Beyond-NE, the mid-term strategy from 2022 to 2024

► Contribution to SDGs

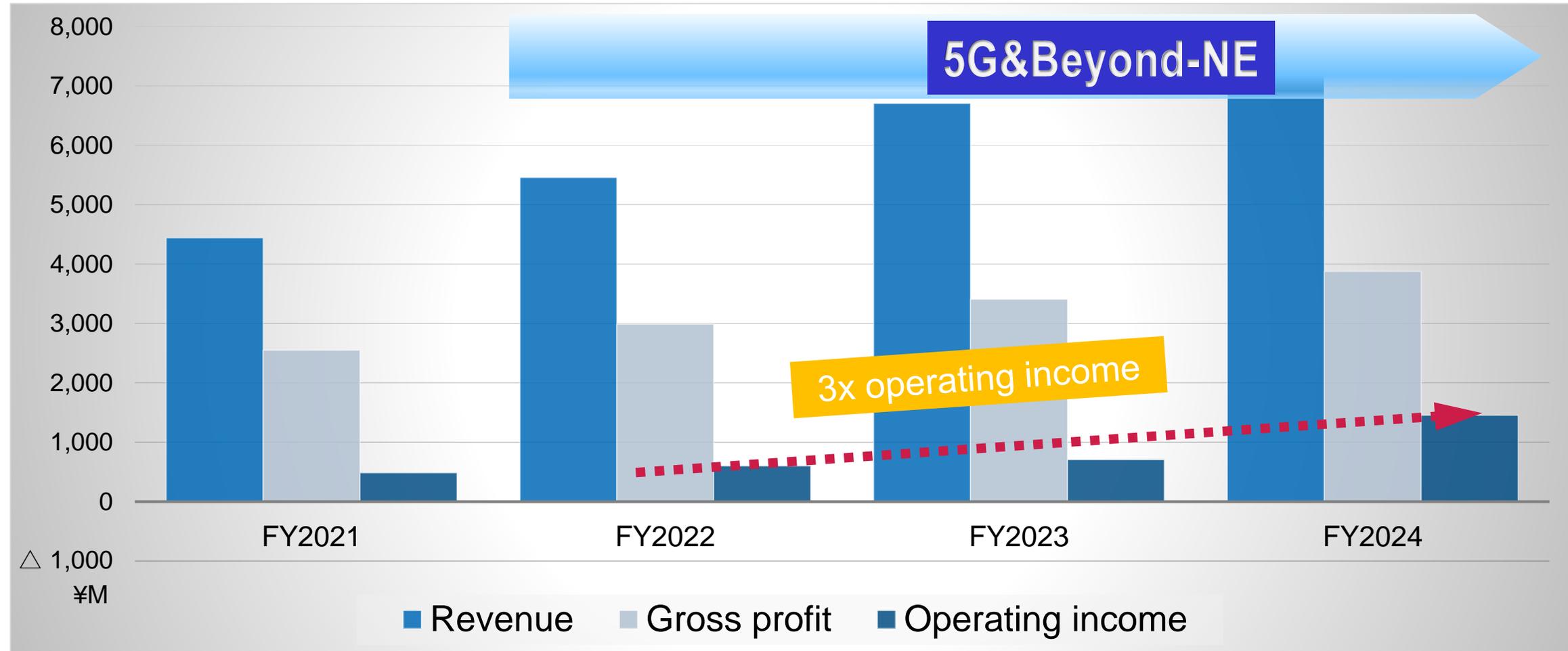
Interface to the Future - Solution by Smart Connectivity -



- ✓ Smarter data transmission in automotive sensing
- ✓ Reducing number of cables by high-speed data transmission technology
- ✓ Reducing energy consumptions by achieving low power consumption and by achieving heat efficiency in power system
- ✓ Reducing energy consumptions in transporting and delivering through AI and IoT technology

5G&Beyond-NE, the mid-term strategy from 2022 to 2024

- ▶ Focusing on growing markets, achieving strategic 5 Goals, aiming to achieve **3x operating income** in FY2024, compared to FY2021



5G&Beyond-NE, the mid-term strategy from 2022 to 2024

► Forecast in FY2023

FY2023 is the second year of the mid-term strategy, “5G&Beyond-NE”

Forecasting increase in sales and operating income through consequent 3 fiscal years.

(yen in million)

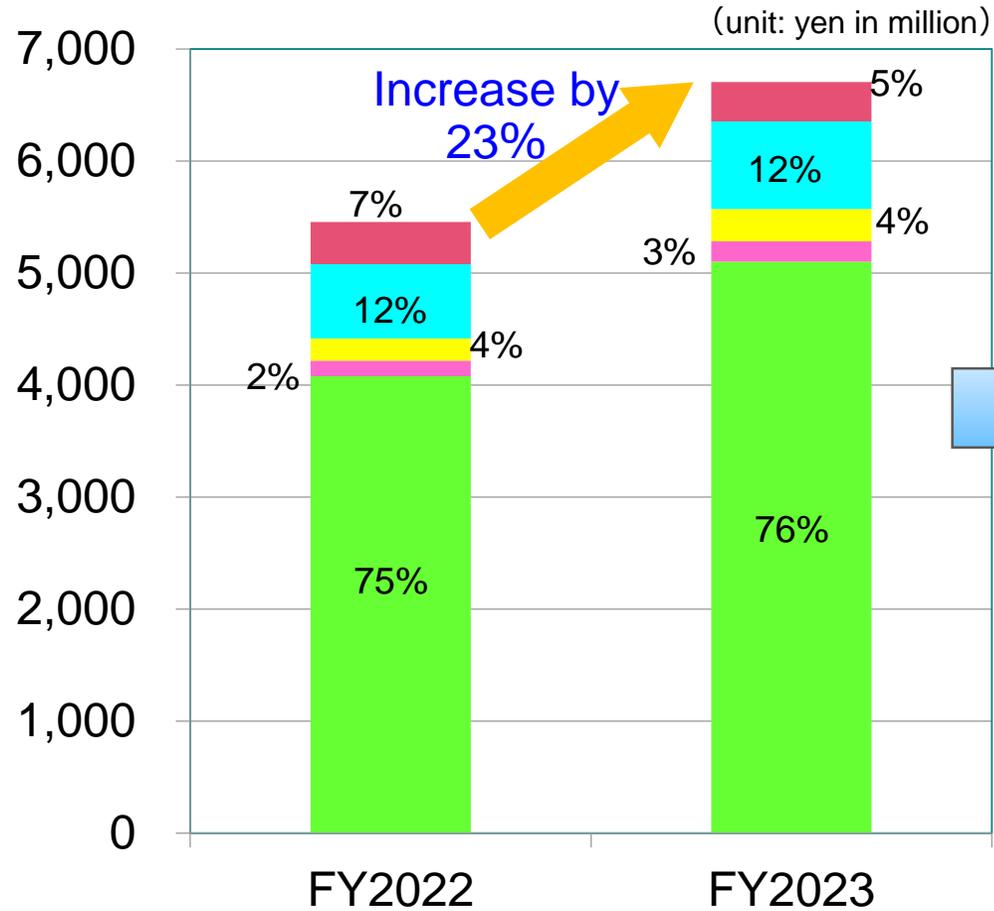
	Forecast in FY2023			FY2022 results		FY2021 results	
		Portion%	YoY		Portion%		Portion%
Revenues	6,705	100.0	123.1	5,456	100.0	4,441	100.0
Gross Profit	3,408	50.8	114.8	2,987	54.8	2,549	57.4
SG&A	2,701	40.3	113.2	2,386	43.7	2,063	46.5
(R&D expenses)	1,210	18.0	119.8	1,009	18.5	801	18.1
Operating Income	706	10.5	117.4	601	11.0	485	10.9
Operating Income before Amortization of Goodwill	836	12.5	114.3	731	13.4	616	13.9
Ordinary Income	707	10.6	78.1	906	16.6	698	15.7
(Ordinary Income* without foreign currency exchange gain or loss)	707	10.6	111.2	636	11.7	491	11.1
Net income attributable to Owner of the Parent	479	7.2	59.5	820	15.0	727	16.4

※Assumed JPY/USD rate in FY2023: JPY130/1USD. The forecast above does not include exchange gain/loss of JPY/USD forecast.

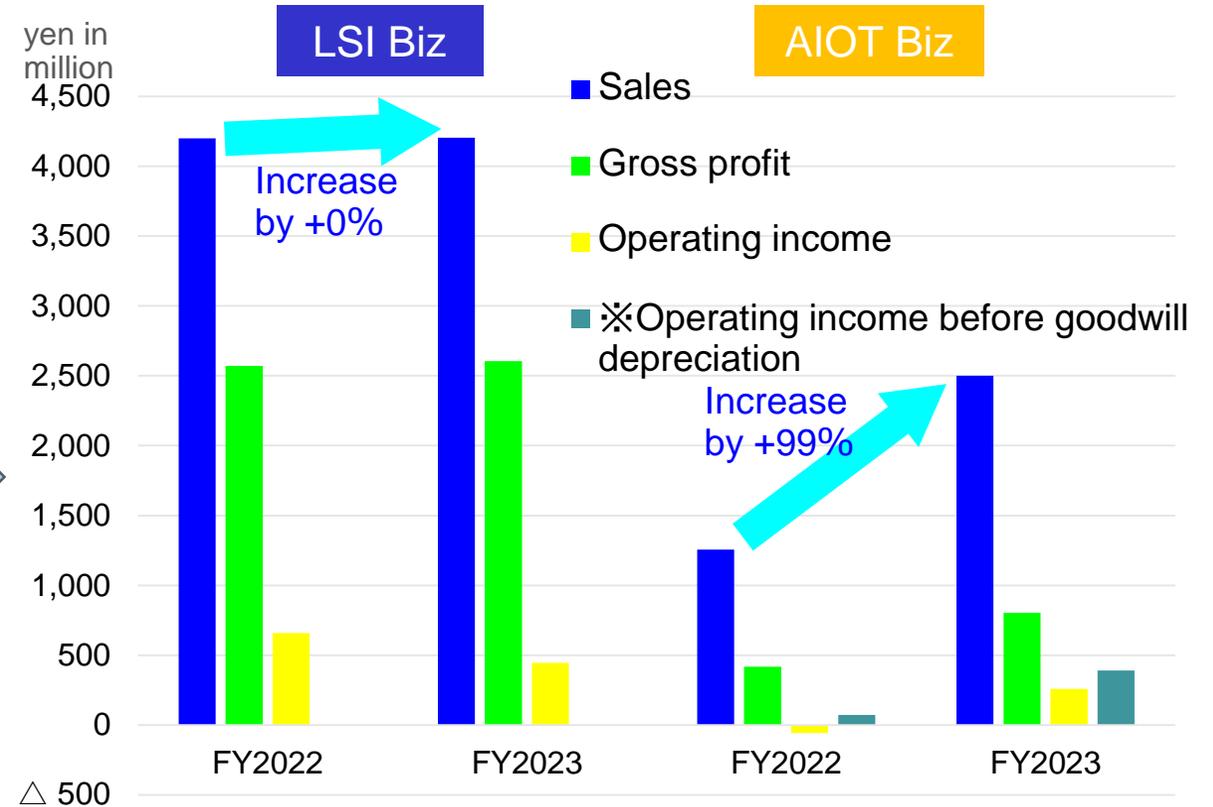
cf. Exchange gain in JPY/USD : JPY270M (FY2022) / JPY207M(FY2021)

5G&Beyond-NE, the mid-term strategy from 2022 to 2024

► Forecast in FY2023 by region and segment



■ Japan ■ Korea ■ Taiwan ■ China ■ US



- In FY2023 AIOT Biz highly contributes to achieve sales growth by +23%, promoting automotive business (drive recorders, etc.) and IoT solutions for infrastructure markets.
- For LSI Biz THine focuses on automotive and industrial markets and positively invests in R&D, increased by +22%, to capture future growth opportunities after FY2024.

Interface to the Future

- Solution by Smart Connectivity -

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